

Application No.: 09/866,996
Amendment Dated: March 12, 2004
Reply to Office Action of: December 12, 2003

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1.-3. (Cancelled).

4. (Currently Amended) An antenna comprising:

a conductive bottom member;

a conductive side member; and

a conductive member arranged in a space surrounded by the bottom member and the side member,

wherein the conductive member is connected to a signal line for transmission and/or reception, ~~and~~

the conductive member and the bottom member are connected to each other in a place other than the signal line or the feeding point, and

a conductive ceiling member covering a part of the space,

wherein the ceiling member has openings.

5. (Cancelled).

6. (Currently Amended) An antenna comprising:

a conductive bottom member;

a conductive side member; and

a conductive member arranged in a space surrounded by the bottom member and the side member, wherein the conductive member is connected to a signal line for transmission and/or reception; and

a conductive ceiling member covering ~~all or a~~ part of the space,

wherein the conductive member extends its entire length normally of the conductive bottom member and the ceiling member, and

the ceiling member has at least one opening.

7. (Previously Presented) The antenna according to claim 6, wherein the conductive member and the ceiling member are connected to each other electrically.

8. (Original) The antenna according to claim 6, wherein the ceiling member and the side member are connected to each other electrically.

9. (Original) The antenna according to claim 6, wherein the ceiling member has a periphery having a curved shape.

10. (Previously Presented) An antenna comprising:

a conductive bottom member;

a conductive side member; and

a conductive member arranged in a space surrounded by the bottom member and the side member,

wherein the conductive member is connected to a signal line for transmission and/or reception, and

at least one of the bottom member and the side member has an opening other than an opening for the signal line.

11. (Currently Amended) An antenna comprising:

a conductive bottom member;

a conductive side member;

a conductive member arranged in a space surrounded by the bottom member and the side member,

wherein the conductive member is connected to a signal line for transmission and/or reception; and

a conductive ceiling member covering ~~all of a~~ part of the space,

wherein the ceiling member has openings.

12. (Original) The antenna according to claim 10 or 11, wherein the openings have means of adjusting their size.

13. (Previously Presented) The antenna according to claim 11, wherein a projection of the conductive member onto the bottom member is an origin point and the bottom member is arranged in an X-Y plane, the bottom member and the side member are symmetric with respect to a Z-Y plane, and the openings are symmetrically arranged with respect to a Z-Y plane.

14. (Original) The antenna according to claim 13, wherein the bottom member and the side member are symmetric with respect to a Z-X plane, and the openings are symmetrically arranged with respect to a Z-X plane.

15. (Currently Amended) An antenna comprising:

a conductive bottom member;

a conductive side member; and

a conductive member arranged in a space surrounded by the bottom member and the side member,

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wherein the conductive member is connected to a signal line for transmission and/or reception;

a dielectric member that has a permittivity higher than air is provided in the space; and

a conductive ceiling member covering a part of the space, ~~and covering only a portion of the~~ and having openings in which a dielectric member is provided.

16. (Original) The antenna according to claim 15, wherein the dielectric member is provided at least so as to cover a part of the space which is not covered with the ceiling conductor.

17. (Original) The antenna according to claim 15, wherein the dielectric member fills the entire inside of the space.

18. (Previously Presented) An antenna comprising:

a conductive bottom member;

a conductive side member;

a conductive member arranged in a space surrounded by the bottom member and the side member,

wherein the conductive member is connected to a signal line for transmission and/or reception;

a conductive ceiling member covering all or part of the space; and

a dielectric member having a permittivity higher than air provided in the space,

wherein the dielectric member has a via hole, and the side member includes the via hole.

19. (Currently Amended) An antenna comprising:

a conductive bottom member;

a conductive side member; and

a conductive member arranged in a space surrounded by the bottom member and the side member,

wherein the conductive member is connected to a signal line for transmission and/or reception; ~~and~~

at least one matching element is arranged apart by a predetermined distance from the conductive member, wherein the matching element and the bottom member are connected to each other electrically; and

a conductive ceiling member covering a part of the space,

wherein the ceiling member has openings.

20. (Original) The antenna according to claim 19, wherein at least one of the matching elements is electrically connected to the conductive member.

21. (Previously Presented) The antenna according to claim 19, wherein at least one of the matching elements is electrically connected to at least one of the ceiling member and the side member.

22. (Currently Amended) An arrangement method of antennas, each antenna including a conductive bottom member, a conductive side member, a conductive member arranged in a space surrounded by the bottom member and the side member, wherein the conductive member is connected to a signal line for transmission and/or reception, and

a conductive ceiling member covering ~~all or a~~ part of the space, the conductive ceiling member having an opening, and the conductive member extending its entire length normally of the conductive bottom member and the ceiling member,

the method comprising a step of aligning and arranging the plural antennas in a manner to produce a direction for minimizing directivity of each of the antennas on a horizontal plane.

23. (Previously Presented) An antenna comprising:

a conductive bottom member;

a conductive side member; and

a conductive member arranged in a space surrounded by the bottom member and the side member,

wherein the conductive member is connected to a signal line for transmission and/or reception; and

a circuit for transmission and/or reception connected to the signal line and arranged in the space.

24. (Original) The antenna device according to claim 23, further comprising a shielding member of covering all or part of the circuit, wherein the shielding member does not contact to the conductive member electrically.

25. (Previously Presented) The antenna device according to claim 24, wherein the shielding member is formed as a concave portion that is part of at least one of the bottom member and the side member; and

all or part of the circuit is arranged in the concave portion.

26. (Previously Presented) The antenna device according to claim 25, further comprising a lid member which covers the concave portion and stores all or part of the circuit, wherein the lid member is electrically connected to at least one of the bottom member and the side member.

27. (Original) The antenna device according to claim 23, wherein the circuit is constituted with a passive circuit.

28. (Original) The antenna device according to claim 23, wherein an active element is contained in the circuit.

29. (Original) The antenna device according to claim 23, wherein a microwave circuit is contained in the circuit.

30. (Original) The antenna device according to claim 23, wherein an optical passive element is contained in the circuit.

31. (Original) The antenna device according to claim 23, wherein an optical active element is contained in the circuit.

32. (Original) The antenna device according to claim 23, wherein the circuit has an IC.

33. (Original) The antenna device according to claim 23, wherein the circuit has such size that the circuit is hidden behind the ceiling member, when viewing the antenna device from the ceiling member side in the direction perpendicularly to the ceiling member.

34. (Original) An array antenna device that is an array antenna device where the plural antenna devices according to claim 23 are arrayed, wherein the circuits in the plural antenna devices each input or output the same signal.

35. (Original) The array antenna device according to claim 23, wherein the circuit has a cartridge form so as to be detachable from the antenna.

36. (Original) The antenna device according to claim 23, wherein the circuit comprises plural sub-circuits having radio systems different from each other, and switching means of switching the connection between anyone of the sub-circuits and the antenna.

37. (Original) The antenna device according to claim 23, wherein the circuit is arranged in the position that hides the circuit behind the ceiling member,

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when viewing the antenna device from the ceiling member side in the direction perpendicularly to the ceiling member.

38. (Original) The antenna device according to claim 23, wherein the circuit comprises: amplification means of amplifying the signal for the transmission and/or reception; and frequency selection means of selecting a frequency of the signal for transmission or the signal for reception.

39. (Original) A radio equipment comprising the antenna device according to any one of claims 23, and a power supply circuit provided in the circuit.

40. (Currently Amended) An antenna comprising:

a conductive bottom member;

a conductive side member; and

a conductive member arranged in a space surrounded by the bottom member and the side member,

wherein the conductive member is connected to a signal line for transmission and/or reception,

the bottom member has a feeding point on a surface thereof, and

the conductive member and the bottom member are connected to each other in a place other than the signal line or the feeding point, and

a conductive ceiling member covering a part of the space,

wherein the ceiling member has openings.

41. (Previously Presented) The antenna according to claim 6, including a dielectric member that has a permittivity higher than air is provided in the space.

42. (Currently Amended) An antenna comprising:

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a conductive bottom member;

a conductive side member;

a conductive member arranged in a space surrounded by the bottom member and the side member,

wherein the conductive member is connected to a signal line for transmission and/or reception;

a conductive ceiling member covering ~~all or a~~ a part of the space,

wherein the ceiling member has at least one opening; and

at least one matching element which is arranged apart by a predetermined distance from the conductive member, wherein the matching element and the bottom member are connected to each other electrically.

43. (Currently Amended) An antenna comprising:

a conductive bottom member;

a conductive side member;

a conductive member arranged in a space surrounded by the bottom member and the side member,

wherein the conductive member is connected to a signal line for transmission and/or reception;

a conductive ceiling member covering ~~all or a~~ a part of the space; and

a circuit for transmission and/or reception connected to the signal line and arranged in the space.